

Smoking and adolescence: Exploring tobacco consumption and related attitudes in three different adolescent groups in Switzerland

Marlène Bosson, Christian Maggiori, Pascal Mark Gyga & Christelle Gay

University of Fribourg, Switzerland

Bosson, M., Maggiori, C., Gyga, P.M., & Gay, C. (2012). Smoking and adolescence: Exploring tobacco consumption and related attitudes in three different age groups in Switzerland. *Journal of Youth Studies*, 15, 225-240

Address for correspondence :

Pascal Gyga
Department of Psychology
University of Fribourg
Rue Faucigny 2
1700 Fribourg, Switzerland
Tél : +41 (0) 26 300 76 40
Fax : +41 (0) 26 300 97 12
Pascal.Gyga@unifr.ch

Abstract

The present study constitutes an investigation of tobacco consumption, related attitudes and individual differences in smoking or non-smoking behaviours in a sample of adolescents of different ages in the French-speaking part of Switzerland. We investigated three school-age groups (7th-grade, 9th-grade and the second-year of high school) for differences in attitude and social and cognitive dimensions. We present both descriptive and inferential statistics. On an inferential level, we present a binary logistic regression based model predicting *risk of smoking*. The resulting model most importantly suggests a strong relationship between smoking and alcohol consumption (both regular and sporadic). We interpret this result in terms of both the impact of the actual campaigns and the cognitive processes associated with adolescence.

Keywords : smoking prevention, smoking habits, attitudes towards smoking

Smoking and adolescence: Exploring tobacco consumption and related attitudes in three different age groups in Switzerland

For the majority of youth, preparing for the fulfilment of a useful role in adult society, the transition to adulthood represents challenges and changes in attitudes, values, competences and social environment (Arnett, 1992). This period is commonly conceived of as a period of stress and storm for most adolescents (Eccles, Midgely, Wigfield, Buchanan, Reuman, Flanagan & MacIver, 1993). From Arnett's (1999) point of view, not all adolescents experience storm and stress, but this period is more likely to be stressful. Shifts from parents' dependency to autonomy, exploring new roles in social and sexual contexts, experiencing relationships and partnerships, planning the future and acquiring values and skills to enter in adulthood all contribute to the particularly difficult time adolescents may experience (Zarrett & Eccles, 2006). Changes on physical and biological levels (e.g., hormone **level**) may also have potential mental or cognitive implications (Arnett, 1992). Adolescents have to cope with a new body, and with influences that these changes have on their mood, behaviours and relationships. Importantly, cognitive functions tend to show declined capacities for probability reasoning and a persistent egocentrism (Arnett, 1992). The latter often results in the ability to perceive danger or negative consequences for others but not for **oneself**.

In addition to these changes new identities are being constructed between the ages of twelve and seventeen approximately (Arnett, 2000). **The influence of peers is important** in this process. Time spent with friends increases while time with parents decreases. The role of peers and friends in the socialization process is often associated with particular patterns of behaviours. For example, adolescents tend to choose friends who are similar to them (i.e., *selective association*) (Arnett, 2000). If influences between one another are complex, adolescents have a tendency to construct their own identities through the peer group who in turn acts as a consolidator.

Not surprisingly, these changes and challenges have often been linked to three particular issues: (a) conflicts with parents and authorities, (b) mood disruptions and mood swings and (c) risk behaviours, with higher risks of **norm-breaking**, recklessness and substance use. Psychological reactance is not uncommon, mainly as a result of the desire to be unique, the need for independence and the need to control their own environment (Miller, Burgoon, Grandpre, & Alvaro, 2006). One typical form of reactance is manifested when adolescents' freedom is threatened, inducing them into the actual prohibited behaviour (e.g., prohibiting smoking can lead adolescents to try it).

Finally, the need to experience new behaviours as part of their identity construction can potentially lead adolescents to risk behaviours, even more so in environments of negative pressure and familial instability (Friedman, 1989). **As such, recent evidence show that peer pressure or peer selection contribute to the initiation of smoking, as well as being confronted with parents who smoke (for e.g. Kluru, Burk, Laursen, Salmela-Aro & Nurmi, 2010; Harakeh, Scholte, Verlmust, de Vries, & Engels, 2010).**

Risk behaviours and their underlying factors

If an exhaustive definition of *risk behaviours* is difficult to provide, they most likely refer to agents, behaviours or conditions associated **with** an increased probability of outcomes damaging health or quality of life. These behaviours can be illustrated by anomalous eating, drinking, drug use, smoking and unprotected sexual relations (Jessor, 1991). Such a definition is inherently complex, especially considering the individual variations within the adolescent population. In fact, researchers have often considered adolescence as one unique group behaving identically with a major peer influence regarding risk-taking, **although it has been argued to be problematic (e.g., Arnett, 2000)**. In this study, we divided our sample into three groups to examine possible variations between them. Still, a crucial issue when investigating the factors underlying risk behaviours in any adolescent population is the idea

that engagement in risk behaviour at one particular moment may only lead to negative consequences (much) later (Essau, 2004). Consequently, some adolescents may have difficulties in weighing the risks surrounding substance use (Miller, Burgoon, Grandpre, & Alvaro, 2006) and may be merely examining the pleasure and sensation potential of the behaviours at stake (Slovic, 2000). In terms of smoking, these mental processes can materialize in adolescents underestimating the addictive risks of tobacco or in their beliefs in smoking cessation before any health problem occurs. In fact, adolescents may not even acknowledge any health risks, at least in the short-term (Slovic 2000). In our study, we were particularly interested in adolescents' view of short- and long-term health risks associated with active as well as passive smoking.

In addition to these different attitudes towards smoking, we were also interested in the behaviours that could be associated with smoking. Past research indicates that alcohol consumption, in terms of onset or of quantity, was related to smoking behaviours (e.g., Harabi, Chahed, Maatoug, Gaha, Essoussi, & Ghannem, 2009; Miller & Plant, 2010; Ozawa, Washio, & Kiyohara, 2008; Takakura & Wake, 2003). Dierker, Rose, Donny and Tiffany (2011) even suggest that treating early alcohol-use disorders could prevent smoking onset or reduce smoking dependence symptoms.

Based on different theoretical models, other factors may influence adolescents' smoking behaviour or smoking cessation. On the one hand, several theories advocate a large influence of social factors (e.g., Bandura, 2004) or perceived social influence (e.g., Ajzen, 1991). These models generally assume that the decision to act comes from a desire to do something to fit the expectations of people close-by - family and/or friends - who serve as role models. Evans, Powers, Hersey and Renaud (2006) show that these social influences peak between mid- to high-school with the strongest relationship between smoking behaviour and peers who smoke. This relationship is also mediated by adolescents' perceived social image of

smoking. On the other hand, individual factors may act as important catalysts of smoking behaviours. For example, self-efficacy, reflected in an individual's tendency to resist cigarettes offers may be determinant (Markham, Aveyard, Thomas, Charlton, Lopez & De Vries, 2004), so would personality traits (Desrichard & Denarié, 2005; Fishbein, 2001), beliefs, perceived confidence and positive self-image (Kulbok, Rhee, Botchwey, Hinton, Bovbjerg & Anderson, 2008) and sensation seeking (Arnett, 1992; Zimmermann, 2010).

In this study, we examined a number of social and individual factors, ranging from *social desirability* to the *need for cognition*. All examined variables, some of which were mainly exploratory, are described in detail in the *method* section. In this line of exploration, we also investigated whether gender was an influential factor among adolescents. This is relevant inasmuch as gender is a social construct (e.g., Bem, 1981) and therefore could logically impact upon certain social factors at the very core of smoking behaviours. There has also been some empirical evidence that gender is related to risk behaviours, at least among adults, women being engaged in risk behaviours less frequently than men (e.g., Evans, Power, Hersey & Renaud, 2006). In a European School Survey Project on Alcohol and Other Drugs, Hibbel et al. (2009) show that this gender difference is not, however, present univocally among adults and adolescents across European countries. For example, if male adolescents generally reported a higher prevalence rate of smoking than female adolescents, this was not the case in Mediterranean countries. In Switzerland, recent findings (Keller, Krebs, Radtke & Hornung, 2007) seem to suggest that, although the prevalence of smoking among male adolescents between the ages of 14 and 19 was slightly higher than among female adolescents, in general they followed similar patterns.

In sum, we have dealt with a number of factors that may contribute to the onset or the continuation of smoking behaviours. If these factors contribute to smoking behaviours, we were also interested in our participants' general knowledge about the effects of smoking

cigarettes and its contribution to explaining smoking propensity.

Knowledge about smoking and health

Health prevention programs have increasingly focused on raising awareness of certain behaviours and their relationship to health. However only few studies **to our knowledge** have focused on adolescent populations. Among those targeted at youth, Friedman (1989) argues that youth tend to focus mainly on the pros of smoking (i.e., social and psychological short-term effects) and to underestimate long-term health risks. Interestingly, and this is not only associated to smoking; adolescents not only seem to be oblivious to negative health consequences, especially long-term ones (Slovic, 2009), but also seem to very much focus on the positive impact of substance use (Jimenez, Rodriguez Diaz, & Sirvent Ruiz, 2006).

Li, Unger, Schuster, Rohrbach, Howard-Pitney and Norman (2003) show, however, that some adolescents, smoking or not, could perceive the risks of smoking and adapt their exposure to smoking behaviours accordingly. Such an adaptive behaviour has been questioned by others (e.g. Antonanzas et al., 2000; Lundborg & Lindgren, 2004) suggesting that if adolescents between twelve and eighteen may *overestimate* risks of lung cancer, it did not necessarily mean that their smoking behaviours were affected. In fact, even if the risks of health problems are being acknowledged, adolescents typically trust their own ability to quit smoking before the onset of the health problems (Schoenbaum, 2005).

Our study

Our study was part of a larger project to create health messages that would appear on cigarette packs in Switzerland specifically targeting adolescents between the ages of 14 and 18. In Gyga, Bosson, Gay and Ribordy (2010), we attempted to identify the linguistic components of tobacco warnings that would be salient enough for adolescents to process. In the present part of the project, we were specifically interested in comparing school-aged adolescent smokers to non-smokers in order to (a) describe smoking behaviours among

adolescents in the French part of Switzerland, (b) identify the contributing factors to smoking behaviours (vs. no-smoking behaviours), and (c) explore tobacco consumption and its related attitudes and cognitive characteristics. In the final part of the project, which we will not discuss here, we evaluated the extent to which the attitudes and behaviours identified in this study could be modulated by specific tobacco warnings, as determined in the first part of the project (Gygax, Bosson, Gay & Ribordy, 2010)

Method

Population

Participants were recruited from five schools that participated in the research program entitled “Relevance of health warnings on cigarette packs: A psycholinguistic investigation” financed by the Swiss Tobacco Prevention Office. The five schools, all in the French part of Switzerland, consisted of two secondary schools (Malleray and La Neuveville) and three high schools (Bienne, Delémont and Tramelan). **All schools responded positively to a global query made by the research team for participating in the project. In all five schools, the project was presented to the directing body, the teachers interested and the educational mediators, who decided upon the feasibility, the scientific pertinence and the ethical appropriateness of the whole research program.** Consent was **subsequently officially** requested from pupils, teachers and school directors. In total, 279 pupils ($M_{age} = 14.50$, $SD_{age} = 1.82$), 164 girls and 115 boys took part in the study. Smokers represent 14.7% of the total population with 41 smokers.

Pupils were divided into three groups. Each group being composed of pupils from a different school level, mainly to avoid any potential cohort effect. In all, there were 97 7th-grade pupils (50 girls and 47 boys aged fourteen to fifteen), 95 9th-grade pupils (49 girls and 44 boys aged sixteen to seventeen) and 87 second-year high school pupils (64 girls and 24 boys aged eighteen to nineteen). **In each school, all classes of the targeted levels**

participated in the study.

Materials

In total, five different questionnaires were administered to the participants, the first one being entirely created for the purpose of this present study (i.e., socio-demographic and **health-related** behaviours), the remaining four being standardized questionnaires. We created the first questionnaire to examine our participants' smoking habits and socio-demographic characteristics. In addition to socio-demographic questions, the first part of the questionnaire (25 questions) was intended to evaluate (1) habitual alcohol consumption, (2) smoking habits, (3) intentions to smoke (in the future) and motivation to quit smoking, (4) self-evaluated risk of future smoking, and finally (5) beliefs about smoking.

Habitual alcohol consumption. **To address the aforementioned relation between smoking behaviours and alcohol consumption (e.g., Harabi et al., 2009; Miller & Plant, 2010; Ozawa et al., 2008; Takakura & Wake, 2003),** two questions assessed how frequently participants drank beer, wine, spirits or others alcoholic drinks, and most importantly how many times they identified as having been drunk over the course of their life.

Smoking habits. One question assessed smoking (i.e., defined as at least more than once a month) or non-smoking behaviour. For smokers, five additional questions assessed the number of cigarettes they consumed per day in the last month, where they found them and for which reasons they smoked (i.e., “add something pleasant” or “expel a bad feeling”).

Intentions to smoke and motivation to quit. Nine questions assessed the importance of acting upon their actual tobacco consumption, readiness to do anything to change their consumption, self-confidence in their ability to quit and the number of attempts to quit.

Self-evaluated risk of future smoking. Three questions assessed self-evaluation of future smoking (a) in the following year, (b) in the next five years, and (c) if one of their best friends would offer them a cigarette.

Beliefs about smoking. Three questions assessed perceived consequences of smoking on smokers' health or on others' health. The second part of the socio-demographic and **health-related** behaviours questionnaire examined participants' surrounding environment in terms of smoking behaviours (i.e., family- and peers) and their sport and exercise practice.

The four additional standardized questionnaires were (1) the Attitudes Towards Smoking scale (Etter, Humair, Bergman & Perneger, 2000), (2) the Behavioural Inhibition, Behavioural Activation and affective responses to impending reward and punishment scale – BIS/BAS (Carver & White, 1994), (3) the Need For Cognition scale (Cacioppo & Petty, 1986), and (4) the Social Desirability scale (Crowne & Marlowe, 1960).

Attitudes Towards Smoking (ATS). This scale was most important, as attitudes towards smoking have been deemed to have a leading role in explaining smoking behaviours (Etter et al., 2000) but at times have also been shown to be neither consistent nor strong predictors of smoking among adolescents aged thirteen to fifteen (De Leeuw, Engels, Vermulst & Scholte, 2008). In our study, we were still interested in these attitudes as predictors of course of smoking behaviours, but also in the underlying factors that could lead to these attitudes.

The scale is composed of 18 items separated in 3 dimensions: *risk perception*, *psychoactive benefits of smoking* and ***pleasure in smoking***. Although primarily targeted at smokers, we modified the items measuring *personal pleasure in smoking* to *perceived pleasure in smoking* to also include non-smokers in the data. For example, the item “in moments of stress, a cigarette helps me to calm down” presented to a participant smoker was changed to “in moments of stress, a cigarette helps smokers to calm down” for non-smokers.

BIS/BAS. The scale measures two dimensions, both based on Gray's (1981) two motivation systems – the *behavioural inhibition* system (BIS) and the *behavioural activation* system (BAS) – that act upon both behaviour and affect. The former (BIS), considered to reduce behaviours leading to painful or negative consequences, is also associated with

increased anxiety in cases where punishment is expected (Carver & White, 1994). People scoring high on the BIS typically experience higher anxiety in aversive situations. The latter (BAS) is considered to be a good predictor of happiness when reward is expected. Those scoring high on the BAS typically experience higher satisfaction when a reward is expected.

The scale is composed of 20 items – statements – measuring approach and avoidance motivation. Participants evaluate each statement on a 4-points Likert scale (*1=very true for me to 4 = very false for me*). Seven items of the BIS focus on the probability of encountering aversive situations and one's sensitivity to them (e.g., "I'm anxious when I make mistakes"). Items of the BAS are divided into three sub-scales measuring *pleasure, response to reward* and *drive to act*. We used the French version of the scale developed by Caci (2007) and validated on adolescents by Caci, Deschaux and Baylé (2007) and Cooper, Gomez and Aucote (2007). Most interesting to us, Voigt, Dillard, Braddock, Anderson, Sopory and Stephenson (2009) found that unlike the BIS, which was mainly associated to diet, physical activity, unsafe acts and substance use, the BAS was associated in particular to alcohol and tobacco use.

Need for Cognition (NFC). This scale, composed of 20 items, measures the intrinsic tendency of people to engage in and enjoy cognitive effort. The need for cognition has been linked to a number of **health-related** concepts, ranging from mammography screening (Williams-Piehot, Schneider, Pizarro, Mowad & Salovey, 2003) to smoking cessation self-efficacy (Haug, Meyer, Ulbricht, Gross, Rumpf & John, 2010), all mostly grounded in the way health messages are framed and their resulting impact on the intention to engage in healthy behaviours (Sanchez, 2006). For example, Vidrine, Simmons and Brandon (2007) showed that adolescents with low need for cognition were more sensitive to emotion-based health warnings whereas participants with high need for cognition were more sensitive to fact-based messages.

The Social Desirability. As defined by Crowne and Marlowe (1960), social desirability scale measures the tendency of respondents to adapt their answers in order to present themselves in a favourable way according to certain social standards. The behaviours typically mentioned in this scale are either culturally sanctioned or approved. We believe this scale to be important, especially for an adolescent population characterized by a great deal of social, cultural and psychological turmoil (Booth-Butterfield, 2003).

Results

In this study, as mentioned earlier, we were specifically interested in comparing school-aged adolescent smokers to non-smokers in order to (a) describe smoking behaviours among adolescents in the French part of Switzerland, (b) identify the contributing factors to smoking behaviours (vs. no-smoking behaviours), and (c) explore tobacco consumption and its related attitudes and cognitive characteristics.

All analyses were conducted using the Statistical Package for Social Sciences (SPSS or PASW) version 18.0 for Mac (SPSS Inc., Chicago IL, USA). The descriptive statistical procedures included simple statistics such as frequencies and percentages. Chi-square tests, χ^2 , were used to compare participants (gender and group age) in terms of their smoking status and their habitual alcohol consumption. For inferential statistics, backward stepwise binary logistic regressions were performed to identify the contributing factors to smoking status among our participants¹. Given the number of independent variables involved, we completed an initial model with Enter method with all the twenty independent variables to select the most important and reduce the risk of random elimination and Type II error. For the stepwise regression method, we used likelihood ratios which are traditionally considered more accurate than the Wald test and the conditional statistic.

Pearson's correlation coefficients (two tailed), r , were estimated to explore smokers (i.e., only smokers) and possible relationships (a) between daily cigarette consumption,

alcohol consumption and drunkenness and (b) between cognitive, psychological and personal factors. We conducted first- and second-order partial correlation, *pr*, to control for the possible effect of gender and age.

Descriptive statistics

In this section, we present the most salient results, especially in terms of the inferential statistics that follow the section.

Habitual alcohol consumption. Participants, smokers and non-smokers ($N = 279$), were asked to indicate their habitual alcohol consumption. Ten percent of the participants (10.1%, $n = 28$) reported drinking beer daily or weekly, 5.0% ($n = 14$) drinking cocktails daily or weekly and 8.2% ($n = 23$) drinking alcopops daily or at least once a week². A majority of participants reported having never drunk beer, cocktails or alcopops (respectively 58.6%, 68.8% and 59.9%). Still, 27.9% of the participants ($n = 76$) admitted having been drunk at least once in their lives. Drunkenness prevalence increased with age, from 5.1% of **seventh-graders** ($n = 5$) to 41.3% of **ninth-graders** ($n = 26$) and 46.4% of high-school pupils ($n = 45$) ($\chi^2 (2) = 49.15, p < .001$). Finally, there were no gender differences ($\chi^2 (1) = 0.01, ns$).

Smoking habits. Participants were asked if they smoked cigarettes or tobacco occasionally or regularly. A total of 14.7% ($n = 41$) admitted smoking (14 men and 27 women). There were no significant gender differences in smoking prevalence among our sample ($\chi^2 (2) = 28.49, p < .001$). Smoking prevalence increased with age from 4.1% ($n = 4$) of **seventh-graders**, to 10.5% ($n = 10$) of **ninth-graders** and 31.0% ($n = 27$) of high-school pupils ($\chi^2 (1) = 0.99, ns$).

Among smokers, 73.2% ($n = 30$) started smoking between the ages of 11 and 14 and 26.8% ($n = 11$) started after the age of fifteen. When asked about their daily consumption during the last 30 days, 36.6% of smokers ($n = 15$) responded smoking no more than 1 cigarette per day, 46.3% of smokers ($n=19$) responded smoking between 2 and 10 cigarettes

per day, and 14.7% of smokers (n=7) indicated smoking at least 11 cigarettes per day during the last 30 days. Note that 34.1% of the adolescent smokers (n = 14) admitted smoking (or being tempted to smoke) in the morning. Interestingly, 73.2% (n = 30) of the smokers saw themselves still smoking in 5 years but almost all of them (95.1%, n = 39) believed that they could quit if they wished to do so. However, less than the half (40.0%) reported the desire to quit now (or in a near future).

Beliefs about smoking. Nearly twelve percent (11.9%, n = 33) of the participants (smokers and non-smokers) believed that smoking for one or two years is *absolutely not* or *not too* dangerous for their health, 60.4% (n = 168) believed that it was *quite dangerous* and the remaining 27.7% (n = 77) believed that it was *very dangerous*. Interestingly, only 5.4% (n = 15) of the participants said that passive smoke was *absolutely not* or *not too* dangerous for their own health, 44.4% (n = 124) believed that it was *quite dangerous* and 50.2% (n = 140) believed that it was *very dangerous*. There seem to be a clear discrepancy between beliefs about active and passive smoke, **as the number of participants who believed passive smoke to be *very dangerous* was nearly double than the number of participants who believed active smoking to be *very dangerous***. Note that 54.2% (n = 150) the participants had at least one family member (i.e., parents, brother-s and/or sister-s) who smoked.

Motivation to quit³. A quarter of smokers (26.8%, n = 11) reported a *low* motivation to quit in a near future, 56.1% (n = 23) indicated a *medium* motivation to change their smoking behaviour or quit and 17.1% (n = 7) a *high* motivation. Importantly, during the preceding year, 48.8% of smokers (n = 20) had already tried to quit, at least for one month. **Out of those, 80% (n=16) indicated a *medium* motivation to change their smoking behaviour (10% in each of the other motivation groups).**

Self-evaluated risk of future smoking. Non-smokers were asked specific questions about their potential smoking behaviour. Almost all non-smoking participants 94.9% of

adolescents (94.9%, $n = 225$) answered negatively to the question *If one of your best friends offered you a cigarette, would you smoke it?*. Still, only 48.9% of non-smokers were certain about not smoking in the upcoming year ($n = 116$), 38.4% were unsure ($n = 91$) and 12.6% said that they probably would ($n=31$).

Inferential statistics – Binary Logistic regression

We use binary logistic regressions with backward stepwise method (likelihood ratio) to predict the binary dependent variable *smoking status* (0 = *Non-smoker*, reference category; 1 = *Smoker*, predicted category), on the basis of continuous and categorical independent variables and to evaluate the relative risk of smoking (odd ratio, OR - value, which is an indicator of the change in odds resulting from a unit change in the predictor, vary between 0 and infinite.).

A first model, which includes all participants of the study ($N = 279$)⁴, was examined by taking into account *smoking status* as the dichotomous dependent variable and items of the smoking and alcohol habits questionnaires (i.e., smoking behaviour in their family **and peers**, and alcohol consumption), ATS factors, NFC scores, BIS-BAS dimensions and Social desirability score as independent variables. A confirmatory model including only 9th-grade and second-year high school pupils was subsequently performed ($N = 182$)⁵.

Binary logistic regressions on all participants. The logistic regression analyses (see Table 1) indicated that a higher consumption of alcohol (OR = 2.99) and more frequent experiences of drunkenness (OR = 22.14) were primary factors in determining the potential smoking status of a participant. In our sample, for example, participants with a greater consumption of alcohol were at least three times more likely to smoke. A lower perception of **pleasure in smoking** (OR = 0.07) was associated with an increased likelihood to smoke. **If this result may appear a little odd at a first glance, it is not that surprising**, as non-smokers probably attribute more pleasure to smoking (i.e., “If they smoke, they must feel

some kind of pleasure”) than smokers. Most importantly, *perceived danger to health* was a prominent predictor of smoking status (OR = 0.01). Participants with a lower perception of danger –evaluated by the *Attitudes Towards Smoking* questionnaire – were seventy times more likely to be smokers. In this case, participants with a lower perception of risk of their own health are seventy times more likely to smoke. None of the other variables (**e.g., parents' and siblings' behaviours**) were retained in the final model. The Hosmer-Lemeshow inferential goodness-of-fit test yielded a χ^2 (8) of 2.15 and was non-significant, suggesting a good model-to-data fit.

Table 2 contains the degrees to which predicted probabilities do agree with actual outcomes. The specificity indicates that the 96.9% of non-smokers were correctly classified whereas the sensitivity indicates that 68.4% of smokers were correctly classified. The false positive rate (indicating the rate of smoker considered to be non-smoker) represents 5.2% of the data and the false negative rate (measuring the proportion of observations misclassified as smoker) 21.2% of the data. The overall correction prediction is 92.7% and shows an improvement over chance level (85.5% in null model).

Ninth-grade and second-year high school pupils. We repeated the same logistic regression analysis by including only 9th-grade and second-year high school participants to verify the previous model with a more balanced smokers vs. non-smokers sample (see Table 3). Globally, this second analysis confirmed that alcohol consumption (OR = 2.60), drunkenness (OR = 17.88), **pleasure in smoking** (ATS) (OR = 0.11) and perceived danger to health (OR = 0.01) were primary factors in determining the potential smoking status of our participants. None of the other variables, such as social desirability, the need for cognition or the smokers' environment, were retained in the final model.

Table 4 presents the degrees to which predicted probabilities do agree with actual outcomes. Analyses showed that 93.5% of non-smokers were correctly classified, as were

60.0% of smokers. The false positive rate represents 8.3% of the data, slightly higher than for the first model, and the false negative rates represents 20.7% of the data. Overall, the model correctly classified 89.7% of the adolescents (and 79.9% in null model).

Adolescent smokers. As previously mentioned, Pearson's correlation coefficients were estimated to explore adolescent smokers and possible relationships between, on the one hand daily cigarette consumption, alcohol consumption and drunkenness and on the other hand cognitive, psychological and personal factors. Again, we conducted first- and second-order partial correlations, *pr*, to control the possible effect of gender and age.

The total number of cigarettes consumed was positively correlated (1) to the **desire** to smoke in the morning ($r = .81, p < .01$), (2) to the number of negative reasons for justifying smoking (e.g., in a stressful situation) ($r = .54, p < .01$) and (3) to the certainty of still smoking in the following five years ($r = .49, p < .01$). Inversely, the total number of cigarettes consumed negatively correlated to perceived self-efficacy to quit smoking ($r = -.64, p < .01$) and to perceived self-efficacy to alter smoking consumption ($r = -.46, p < .01$). Still, consumption frequency (i.e., daily,...) correlated with perceived psychoactive effects (ATS) ($r = .41, p < .01$). No other correlation reached significance. When we conducted first- and second-order correlations, controlling for age and gender, the pattern of results remained unchanged.

Discussion

The present study provides us with an interesting insight into a sample of adolescents of different ages in the French-speaking part of Switzerland. On a descriptive level, four results have particularly caught our attention. First, the prevalence of alcohol consumption seems quite high. As alcohol consumption is also associated with smoking probability, we will discuss alcohol consumption at length when discussing our inferential statistics. Second, if a majority of smokers still picture themselves as smokers in the next five years, there was

hardly any doubt for them that they could quit whenever they wanted (**i.e., 95.1% of smokers believed that they could quit if they wished to do so**). This mirrors Slovic's (1998) *optimistic bias* or the overconfidence found by Schoenbaum (2005). **This overconfidence seems even more blatant in light of the fact that at least half of the smokers had already tried, unsuccessfully though, to quit smoking.** Third, the discrepancy found between beliefs about active and passive smoking indicates that most of the adolescents in our study think that passive smoke is more damaging to their health than active smoking. We believe that this result could be explained in two different ways. On one hand, it could be due to recent campaigns across the globe targeting smoking in public places, putting passive smoke in the centre of the debate. These campaigns might have had a collateral effect, namely to conceal the seriousness of active smoking. On the other hand, active smoking is a personal behaviour, and passive smoke relates to others. It could be the case that participants responded to these questions as if they were formulated in terms of “If I smoke, is it dangerous to others”. In this sense, adolescents may view others at risk even when they do not see themselves at risk, as suggested by Slovic (2000). It also confirms the idea that smokers have difficulties to perceive negative consequences for themselves whereas they attribute negative consequences of smoking to others (Arnett, 1992). Fourth and finally, only half of the non-smokers were certain of not smoking in the upcoming year. The others were either uncertain or thought that they probably would. In terms of prevention, this is not reassuring at all, as it seems that non-smokers already think about the possibility of smoking. Our data cannot untangle this issue, a more qualitative assessment of the reasons why some non-smokers are unsure about smoking (or not smoking for that matter) in the upcoming year would be required.

On an inferential basis, our regression analyses raised three main issues. First and foremost, they suggest that alcohol and smoking are hardly dissociable. Others have also found such an association (e.g., Harrabi et al., 2009). A directed short term cause-to-effect

would be unreasonable at this point, and most probably not very useful. Instead, it is important to consider these two behaviours as part of a network of behaviours (as suggested by Arnett, 2000), maybe in longitudinal studies. The very nature of this network, as well as its components, is difficult to define presently, but in a health perspective it might be important to examine it with more scrutiny. This is especially true in Switzerland as Thérin (2010) recently showed that 35% of Swiss youth aged between 14 and 15 indicate drinking alcohol at least once a month and 17% of Swiss youth indicate drinking every week. Zimmermann (2010) also found that most of the adolescents in his study in Switzerland claimed to have drunk alcohol during the preceding year with 76.1% of them claiming to have been drunk at least once. Note that half of the adolescents in his sample were smokers, which indicates maybe a particular sample. Second, we found an intriguing relationship between perception of **pleasure in smoking** and likelihood to smoke. More specifically, it appears that non-smokers attribute more pleasure to smoking than do smokers. If we interpreted this in the *result section* in terms of “If they smoke, they must feel some kind of pleasure”, at least it signals that smokers may not smoke because of a possible gain of pleasure (although their scores were still quite high). Note that both interpretations are only tentative and would need more data to be confirmed. Third and finally, reassuringly, our variable *perceived danger to health* was a prominent predictor of smoking. Lower perceived danger was associated with a higher likelihood of smoking. In terms of prevention programs or campaign, this result confirms that adequate information on the perceived danger might still be effective. Note that we could also argue that actually, smokers tend to explicit lower danger to health associated to smoking as a defence mechanism, merely to reduce the dissonance associated with the fact that they smoke, even though they know it is a bad habit. In other terms, it means that if one smokes, it is necessary to believe that smoking is not too bad for one's health to avoid feeling distress by the dissonance created by the behaviour.

If null results tend to be tricky to interpret, there were little signs of *social desirability*, *need for cognition* or beliefs about short- and long-term effects in our results. There were also very little effects of gender or age, except that for the latter, confirming epidemiological studies (e.g., ISPA & OFSP, 2008), smoking seemed to increase with age. Age has to be considered very cautiously though, as the number of smokers in each age group was quite uneven, at times very small. Finally, parents' and siblings' behaviours did not seem to have a strong impact upon the participants' behaviours, **as none of the two factors seemed determinant of the potential smoking status of participants (i.e., none of these factors appeared significant in our regression models).**

Prevention programs may include some of the findings of this present study. For example, primary prevention programs could focus on the assumption of overestimated *smoke-related pleasure*. They could also target risky behaviours as part of a network, considering jointly alcohol and tobacco consumption for example. These primary prevention programs are of high importance, as suggested by Crone, Spruitj, Dijkstra, Willemsen and Paulussen (2011) who showed that prevention programs in elementary school could have an enduring impact in secondary school as suggested by higher intentions *not to smoke*.

References

- Ajzen, I. (1991). The Theory of Planned Behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179-211.
- Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behaviour. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.). *The handbook of attitudes* (pp. 173-221). Mahwah, NJ: Erlbaum.
- Antonanzas, F., Viscusi, W.K., Rovira, J., Brana, F.J., Portillo, F., & Carvalho, I. (2000). Smoking risks in Spain: Part I – Perception of risks to the smokers. *Journal of Risk and Uncertainty*, 21, 161-186.
- Arnett, J. (1992). Reckless behaviour in adolescence: a developmental perspective. *Developmental Review*, 12, 339-373.
- Arnett, J. (1999). Adolescent storm and stress, reconsidered. *American Psychologist*, 54, 317-326.
- Arnett, J. (2000). A theory of development from the late teens through the twenties. *American Psychologist*, 55, 469-480.
- Arnett, J. (2000). Optimistic bias in adolescent and adult smokers and non-smokers. *Addictive Behaviours*, 25, 625-632.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behaviour*, 31, 143-164.
- Bem, S.L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review*, 88, 354-364.
- Bricker, J.B., Peterson, A.V., Leroux, B.G., Andersen, M.R., Bharat Rajan, K., & Sarason, I.G. (2006). Prospective prediction of children's smoking transitions: role of parents'

- and older siblings' smoking. *Addiction*, 101, 128-136.
- Bricker, J.B., Peterson, A.V., Andersen, M.R., Sarason, I.G, Bharat Rajan, K., & Leroux, B.G. (2007). Parents' and older siblings' smoking during childhood: Changing influences on smoking acquisition and escalation over the course of adolescence. *Nicotine and Tobacco Research*, 9, 915-926.
- Caci, H., Baylé, F.J., & Deschaux, O. (2007). Psychometric properties of the French versions of the BIS/BAS scales and the SPSRQ. *Personality and Individual Differences*, 42, 987-998.
- Cacioppo, J.T., & Petty, R.E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, 42, 116-131.
- Cacioppo, J.T., Petty, R.E., & Morris, K.(1983). Effects of need for cognition on message evaluation, recall, and persuasion. *Journal of Personality and Social Psychology*, 45, 805-818.
- Carver, C.S., & White, T.L. (1994). Behavioural inhibition, behavioural activation and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, 67, 319-333.
- Cooper, A., Gomez, R. & Aucote, H. (2007). The behavioural inhibition system and behavioural approach system (BIS/BAS) scales: Measurement and structural invariance across adults and adolescents. *Personality and Individual Differences*, 43, 295-305.
- Crone, M.R., Spruijt, R., Dijkstra, N.S., Willemsen, M.C., & Paulussen, T.G. (2011). Does a smoking prevention program in elementary schools prepare children for secondary school?. *Preventive Medicine*, 52 (1), 53-59.
- Crowne, D.P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 24, 349-354.
- Day, D.Y., & Wang, X. (2007). The role of need for cognition and reader beliefs in text

- comprehension and interest development. *Contemporary Educational Psychology*, 32, 332-347.
- De Leeuw, R.N.H., Engels, R.C.M.E, Verlmust, A.A., & Scholte, R.H.J. (2008). Do smoking attitudes predict behaviour? A longitudinal study on the bi-directional relations between adolescents' smoking attitudes and behaviours. *Addiction*, 103, 1713-1721.
- De Vries, H., Dijkstra, M., & Kuhlman, P. (1988). Self-efficacy the third factor besides attitudes and subjective norm as a predictor of behavioural intentions. *Health Education Research*, 3, 273-282.
- Desrichard, O., & Denarié, V. (2005). Sensation seeking and negative affectivity as predictors of risky behaviours: A distinction between occasional versus frequent risk-taking. *Addictive Behaviours*, 30, 1449-1453.
- Dierker, L.C., Rose, J.S., Donny, E. & Tiffany, S. (2011). Alcohol use as a signal for sensitivity to nicotine dependence among recent onset smokers. *Addictive Behaviour*, 36, 421-426.
- Eccles, J.S., Midgely, C., Wigfield, A., Buchanan, C.M., Reuman, D., Flanagan, C., & MacIver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist*, 48, 90-101.
- Etter, J.F., & Humair, J.P. (2000). Development and validation of the attitudes towards smoking scale (ATS-18). *Addiction*, 95, 613-625.
- Etter J.F., Bergman M. M., Humair J.P., & Perneger T.V. (2000). Development and validation of a scale measuring self-efficacy of current and former smokers. *Addiction*, 95, 901-913.
- Etter, J.F., Prokhorov, A.V., & Perneger, T.V. (2002). Gender differences in the psychological determinants of cigarette smoking. *Addiction*, 97, 733-743.

- Etter, J.F. (2010). Smoking and Cloninger's temperament and character inventory. *Nicotine & Tobacco Research, 12*, 919-926.
- Essau, C.A. (2004). Risk-taking behaviour among German adolescents. *Journal of Youth Studies, 7*, 499-512.
- Evans, W.D., Powers, A., Hersey, J., & Renaud, J. (2006). The influence of social environment and social image on adolescent smoking. *Health Psychology, 25*, 26-33.
- Feil, J., & Hasking, P. (2008). The Relationship between personality, coping strategies and alcohol use. *Addiction research and theory, 16*, 526-537.
- Fishbein, M., Triandis, H.C., Kanfer, F.H., Becker, M., Middlestadt, S.E., & Eichler, A. (2001). Factors influencing behaviour and behaviour change. In A. Baum, Revenson, T.A., & Singer, J.E. (Ed.), *Handbook of health psychology* (pp. 3-17). New Jersey: Lawrence Erlbaum Associates Publishers.
- Friedman, H.L. (1989). The health of adolescents: Beliefs and behaviour. *Social Science Medicine, 29*, 309-315.
- Ginet A, & Py, J. (2000). Need for cognition: A French scale for children and its consequences on a sociocognitive level. *Année Psychologique, 100*, 585-628.
- Gilbert, E. (2007). Constructing "fashionable" youth identities: Australian Young Women cigarette smokers. *Journal of Youth Studies, 10*, 1-15.
- Global Youth Tobacco Survey Collaborating Group (2003). Differences in Worldwide Tobacco Use by Gender: Findings from the Global Youth Tobacco Survey. *Journal of School Health, 73*, 207-215.
- Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), *A model for personality* (pp. 246-276). New York: Springer.
- Gygax, P.M., Bosson, M., Gay, C. & Ribordy, F. (2010). Relevance of health warnings on

- cigarette packs: A psycholinguistic investigation. *Health Communication*, 25, 397-410.
- Harakeh, Z., Scholte, R.H.J., Vermulst, A.A., de Vries, H., & Engels, R.C.M.E. (2010).**
The relation between parents' smoking, general parenting, parental smoking communication, and adolescents' smoking. *Journal of Research on Adolescence*, 20, 140-165.
- Harrabi, I., Chahed, H., Maatoug, J., Gaha, J., Essoussi, S., & Ghannem, H. (2009). Predictors of smoking initiation among schoolchildren in Tunisia: a 4 years cohort study. *African Health Science*, 9, 147-152.
- Haug, S., Meyer, C, Ulbricht, S., Gross, B., Rumpf, H.J., & John, U. (2010). Need for Cognition as a predictor and a moderator of outcome in a tailored letters smoking cessation intervention. *Health Psychology*, 29, 367-373.
- Hibell, B., Guttormsson, U., Ahlström, S., Balakireva, O., Bjarnason, T., Kokkevi, A., & Kraus, L. (2009): The 2007 ESPAD Report - Substance Use Among Students in 35 European Countries. The Swedish Council for Information on Alcohol and Other Drugs (CAN). Stockholm: Sweden.
- Institut suisse de prévention de l'alcoolisme et autres toxicomanies (ISPA), & Office fédéral de la santé publique (OFSP) (Eds.). (2008). *La consommation d'alcool, de tabac et de cannabis des jeunes: données et éclairages*. Lausanne / Berne: ISPA / OFSP.
- Jessor, R. (1991). Risk behaviour in adolescence; A psychosocial framework for understanding and action. *Journal of Adolescent Health*, 12, 597-605.
- Jimenez, M., Rodriguez Diaz, F.J., & Sirvent Ruiz. C. (2006). Factors related to young people's attitudes to the consumption of alcohol and other psychoactive substances. *Psicothema*, 18, 52-58.
- Keller, R., Radtke, T., Krebs, H., & Hornung, R. (2010). *Der Tabakkonsum der Schweizer Wohnbevölkerung in den Jahren 2001 bis 2009. Tabakmonitoring-Schweizerische*

Umfrage zum Tabakkonsum. Im Auftrag des Bundesamtes für Gesundheit, Gesundheitspolitik, Fachstelle Tabakpräventionsfonds. Zürich: Psychologisches Institut der Universität Zürich, Sozial- und Gesundheitspsychologie.

Kluru, N., Burk, W.J., Laursen, B., Salmela-Aro, K., & Nurmi, J.E. (2010). Pressure to drink but not to smoke: Distangling selection and socialization in adolescent peer networks and peer groups. *Journal of Adolescence*, 33, 801-812.

Kulbok, P.A., Rhee, H., Botchwey, N., Hinton, I., Bovberg, V., & Anderson, N.L. (2008). Factors influencing adolescents' decision not to smoke. *Public Health Nursing*, 25, 505-515.

Lauriola, M., Russo, P.M., Lucidi, F., Violani, C., & Levin, I.P. (2005). The role of personality in positively and negatively framed risky health decisions. *Personality and Individual Differences*, 38, 45-59.

Li, C., Unger, J.B., Schuster, D., Rohrbach, L.A., Howard-Pitney, B., & Norman, G. (2003). Youths' exposure to environmental tobacco smoke (ETS). Associations with health beliefs and social pressure. *Addictive Behaviours*, 28, 39-53.

Lundborg, P. & Lindgren, B. (2004). Do they know what they are doing? Risk perceptions and smoking behaviour among Swedish teenagers. *Journal of Risk and Uncertainty*, 28, 261-286.

Markham, W.A., Aveyrd, P., Thomas, H., Charlton, A., Lopez, M.L., & De Vries, H. (2004). What determines future smoking intentions of 12- to 13-year-old UK African-Caribbean, Indian, Pakistani and white young people? *Health Education Research*, 19, 15-28.

Miller, C.H., Burgoon, M., Grandpre, J.R., & Alvaro, E.M. (2006). Identifying principal risk factors for the initiation of adolescent smoking behaviours: The significance of psychological reactance. *Health Communication*, 19, 241-252.

- Ozawa, M., Washio, M., & Kiyohara, C. (2008). Factors relates to starting and continuing smoking among senior high school boys in Fukuoka, Japan. *Asian Pacific Journal of Cancer Prevention*, 9, 239-245.
- Sanchez, J.C. (2006). Efectos de la presentación del mensaje para realizar conductas saludables: El papel de la autoeficacia y de la motivación cognitiva. *International Journal of Clinical and Health Psychology*, 6, 613-630.
- Sherman, D.K. Mann, T. & Updegraff, J.A. (2006). Approach/avoidance motivation, message framing, and health behaviour: Understanding the congruency effect. *Motivation and Emotion*, 30, 164-168.
- Slovic, P. (1998). Do adolescent smokers know the risks? *Duke Law*, 47, 1132-1141.
- Slovic, P. (2000). What does it mean to know a cumulative risk? Adolescents' perceptions of short-term and long-term consequences of smoking. *Journal of Behavioural Decision Making*, 13, 259-266.
- Takakura, M. and Wake, N. (2003), Association of Age at Onset of Cigarette and Alcohol Use with Subsequent Smoking and Drinking Patterns Among Japanese High School Students. *Journal of School Health*, 73, 226–231.
- Thérin, R. (2010). Enquête HBSC 2006 - La consommation d'alcool des jeunes et de leurs pairs [Feuille-info]. Lausanne: Institut suisse de prévention de l'alcoolisme et autres toxicomanies.
- Torres, R. and Fernandez, F. (1995). Self-esteem and value of health as determinants of adolescent health behaviour. *Journal of Adolescent Health*, 16, 60-63.
- Vidrine, J.I., Simmons, V.N., & Brandon, T.H. (2007). Construction of smoking-relevant risk perceptions among college students: The influence of Need for Cognition and message content. *Journal of Applied Social Psychology*, 37, 91-114.
- Verardi, S., Dahourou, D., Ah-Kion, J., Bhowon, U., Ng Tseung, C., Amoussou-Yeye, D.,

- Adjahouisso, M., and al. (2010). Psychometric properties of the Marlowe-Crowne Social Desirability scale in eight African countries and Switzerland. *Journal of Cross-cultural Psychology*, 41, 19-34.
- Voigt, D., Dillard, J., Braddock, K., Anderson, J., Sopory, P. & Stephenson, M. (2009). Carver and White's (1994) BIS/BAS Scales and Their Relationship to Risky Health Behaviours. *Personality and Individual Differences*, 47, 89-93.
- Weinstein, N.D. (1998). Accuracy of smokers' risk perceptions. *Annals of Behavioural Medicine*, 20, 135-140.
- Weinstein, N.D., Marcus, S.E., & Moser, R.P. (2005). Smokers' unrealistic optimism about their risk. *Tobacco Control*, 14, 55-59.
- Williams-Piehot, P., Schneider, T.R., Pizarro, J., Mowad, L., & Salovey, P. (2003). Matching health messages to information-processing styles: Need for cognition and mammography utilization. *Health Communication*, 15, 375-392.
- Zarret, N., & Eccles, J. (2006). The passage to adulthood: Challenges of late adolescence. *New directions for youth development*, 111, 13-28.
- Zimmermann, G. (2010). Risk perception, emotion regulation and impulsivity as predictors of risk behaviours among adolescents in Switzerland. *Journal of Youth Studies*, 13, 83-99.

Acknowledgements

This study was supported by the Tobacco Prevention Office (part of the OFSP) and is part of a two-year project on the creation of relevant warning messages. We are indebted to Marjorie Grivel and Philippe Handschin for helping us to collect the data. Great thanks to Cathy Moeschler, Pierre-Alain Diacon, Jacques Diacon, Karim Errard, Aldo Della Piazza and all the other teachers and students that participated in this phase of the project.

Footnotes

¹Dichotomized smoking factor / measures (*smoker* vs *non-smoker*) have been often used in previous studies concerning smoking among adolescents (e.g. De Vries, Engels, Kremers, Wetzels, & Mudde, 2003; Otten, Van der Ven, Engels & Van den Eijnden, 2009; Zbikowski, Klesges, Robinson, & Alfano, 2002).

²For clarity reasons, we only limited our analyses on beer, cocktails and alcopops, as all three were most often cited and drunk by our participants.

³Mean scores were calculated on three different items per questions (with a ten-point scale, *1 = Absolutely not important to 10 = Very important*): *importance to do something now for one's tobacco consumption, readiness to change one's smoking behaviour and self-confidence in one's abilities to quit*.

⁴Because of missing data, logistic regression models only include 262 adolescents (including 38 smokers).

⁵Because of missing data on several predictors, the number of adolescents involved in the logistic regression analysis is N = 174 (including 35 smokers).

Table 1. Logistic regression analysis of 262 adolescents for smoking status (final step of Backward likelihood; Smoker = predicted category)

Predictor	β	$SE \beta$	Wald's χ^2	df	p	e^{β} (odds ratio)
Constant	3.004	2.838	1.120	1	.290	
Gender	-0.971	0.552	3.089	1	.079	0.379
Alcohol consumption	1.096	0.373	8.652	1	.003	2.992
Drunkenness	3.098	0.778	15.832	1	.000	22.143
ATS – Pleasure in smoking	-2.600	0.865	9.031	1	.003	0.074
ATS – Negatives effects	-4.249	1.270	11.192	1	.001	0.014

Note: Cox and Snell $R^2 = .354$, Nagelkerke $R^2 = .628$. Model $\chi^2(5) = 114.340$, $p < .000$; Hosmer & Lemeshow $\chi^2(8) = 2.150$, $p = .976$. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2. Classification table for smoking status (N = 262 adolescents; Smoker = predicted category)

Observed	Predicted	
	Non-smoker	Smoker
Non-smoker	217	7
Smoker	12	26
Overall % correct		

Note: Specificity = 95.6%. Sensitivity = 68.4%. False positive = $12/(12+217)\% = 5.2\%$. False negative = $7/(7+26)\% = 21.2\%$

Table 3. Logistic regression analysis of 174 adolescents (9th-grade and second-year high school pupils) for smoking status (final step of Backward likelihood; Smoker = predicted category)

Predictor	β	$SE \beta$	Wald's χ^2	df	p	e^{β} (odds ratio)
Constant	-6.696	4.726	2.008	1	.157	
Age	0.351	0.191	3.365	1	.067	1.420
Alcohol consumption	0.955	0.411	5.395	1	.020	2.599
Drunkenness	2.884	0.885	10.616	1	.001	17.883
BIS-BAS – response reward	1.345	0.766	3.084	1	.079	3.838
ATS – Pleasure in smoking	-2.211	0.952	5.393	1	.020	0.110
ATS – Negatives effects	-4.610	1.419	10.554	1	.001	0.010

Note: Cox and Snell $R^2 = .395$, Nagelkerke $R^2 = .629$. Model $\chi^2(6) = 87.575, p < .000$; Hosmer & Lemeshow $\chi^2(8) = 2.244, p = .973$. $^{\dagger} p < .10$, $* p < .05$, $** p < .01$, $*** p < .001$

Table 4. Classification table for smoking status (N = 279 adolescents; Smoker = predicted category)

Observed	Predicted	
	Non-smoker	Smoker
Non-smoker	133	6
Smoker	12	23
Overall % correct		

Note: Specificity = 95.7%. Sensitivity = 65.7%. False positive = $12/(12+133)\% = 8.3\%$. False negative = $6/(6+23)\% = 20.7\%$.